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Assessment of exposure to lead and cadmium through biological monitoring: results of a UNEP/WHO global study.

Friberg L, Vahter M

This paper describes a UNEP/WHO project on the assessment of human exposure to lead and cadmium through analysis of blood and kidneys. The following countries have participated: Belgium, India, Israel, Japan, Mexico, People's Republic of China, Peru, Sweden, United States, and Yugoslavia. No laboratory started the monitoring before achieving satisfactory results of quality control (QC) analysis (samples of cow blood spiked with lead and cadmium and freeze-dried horse kidney cortex for cadmium analysis) according to predetermined criteria based on a linear regression model. Two hundred teachers from one urban area in each country constituted the target group for lead and cadmium in blood and cases of "sudden, unexpected death" for cadmium in kidney cortex. QC samples were analyzed in parallel with the monitoring samples to assure validity of the obtained results. The quality assurance program also included preanalytical quality control. There was considerable variation in metal exposure between areas. Geometric means for lead in blood ranged from about 60 micrograms Pb/liter in Beijing and Tokyo to 225 in Mexico City. The values were below 100 micrograms Pb/liter also in Baltimore, Jerusalem, Lima, Stockholm, and Zagreb, and between 100 and 200 micrograms Pb/liter in Brussels and India. In general, males had higher blood levels than female and smokers higher than nonsmokers. With a few exceptions the values were lower than results reported in a recent study within the European Communities. Geometric means for cadmium in blood ranged from 0.5 microgram Cd/liter in Stockholm and Jerusalem to 1.2 in Brussels and Tokyo. Cadmium levels were considerably higher among smokers than among nonsmokers. Tokyo had the highest values for cadmium in kidney cortex with a geometric mean in the age group 40-60 years of 60-70 mg Cd/kg wet wt. Lowest values were found in Baltimore, Beijing, India, and Jerusalem, with means around 20-25 mg Cd/kg wet wt. There was a tendency toward higher values for smokers than for nonsmokers, but no differences related to sex. Data were not received from Mexico and Peru.

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